




**STATEMENT**

I, Kari Pirhonen, hereby state that I am competent in both the Finnish and English languages and that the attached English translation is an accurate translation of United States Patent Application S.N. 10/811,302 filed on March 29, 2004.

Date: May 10, 2004

Name: 

## **METHOD AND DEVICE FOR APPLYING A PLASTIC FILM AROUND A PRODUCT TO BE PACKAGED**

### **METHOD DISCLOSED BY THE INVENTION**

- 5 The present invention relates to a method for applying a plastic film around a product to be packaged, according to which method
- the product to be packaged is moved to a position inside a plastic film girdle of shrinkable and/or stretchable plastic placed on a supporting frame consisting of supporting elements and having a circumference larger than the circumference of the
  - 10 product to be packaged, or correspondingly the plastic film girdle is moved to a position surrounding the product to be packaged,
  - whereupon the supporting frame consisting of supporting elements is removed from inside the plastic film girdle, with the result that the plastic film girdle is tightened around the product to be packaged.

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### **PRIOR ART**

- A method for applying a plastic film around a product to be packaged is presented in Specification US-4,454,705, wherein a plastic film girdle of shrinkable plastic is placed on a supporting frame and the product to be packaged is brought to a position inside the
- 20 supporting frame. When the supporting elements of the supporting frame are removed, the plastic film girdle is tightened around the product. However, this method is not sufficiently efficient when it is necessary to get several products packaged in a short time. In addition, plastic film girdle has to be of a suitable size corresponding to the product to be packaged.
- 25 Another alternative for applying a plastic film around a product to be packaged is to bring the product to the wrapping station of a wrapping packaging machine, where the product to be packaged is held stationary while wrapping packaging film is wrapped around the product from a film reel circulating about the product. An essential feature of the prior-art wrapping method is that the product to be packaged remains stationary during the
- 30 wrapping operation and the wrapping line is halted each time for as long as it takes to wrap up the product. The duration of the halt is additionally increased by the starting actions and the seaming and cutting of the wrapping film band associated with the wrapping operation. However, in practice it is important that the capacity of the packaging method used should be as high as possible to enable the products to be packaged to be passed through the
- 35 packaging stage as quickly as possible.

## **OBJECT OF THE INVENTION**

The object of the present invention is to overcome the above-described drawbacks and achieve a new and faster method for applying a wrapping plastic film around an object. A specific object of the invention is to achieve a method for creating collars or girdles around a product to be packaged. Collars or girdles can also be made from wrapping plastic film, and these have numerous advantages as compared to prior-art girdles formed from steel or hard plastic bands, because a girdle formed from wrapping plastic film is softer and more resilient. It requires no corner supports to be used in conjunction with it and yet it does not damage the edges of the product to be packaged. However, producing a girdle by means of a wrapping packaging apparatus is a slow and uneconomical method as each girdle has to be wrapped separately.

## **FEATURES OF THE METHOD OF THE INVENTION**

The method of the invention is characterized in

- that the plastic film girdle is formed by wrapping shrinkable and/or stretchable wrapping plastic film band to form a plastic film girdle around the supporting frame consisting of supporting elements and having a circumference larger than the circumference of the product to be packaged,
- that the product to be packaged and/or the plastic film girdle are/is moved so that the product to be packaged remains inside the plastic film girdle,
- and that the supporting frame consisting of supporting elements is removed from inside the plastic film girdle and the plastic film girdle is allowed to tighten around the product to be packaged.

## **EMBODIMENTS OF THE METHOD OF THE INVENTION**

A preferred embodiment of the invention is characterized in

- that the plastic film girdle is formed by wrapping a wrapping plastic film band around the supporting frame consisting of supporting elements
- that the wrapping plastic film band supplied to form the plastic film girdle is severed and, if necessary, seamed,
- that the product to be packaged and/or the plastic film girdle are/is moved on a track so that the product to be packaged remains inside the plastic film girdle,
- and that the supporting frame consisting of supporting elements is removed from inside the plastic film girdle and the plastic film girdle is allowed to shrink and tighten around the product to be packaged.

Since the plastic film to be wrapped consists of either stretched plastic film or tightened or otherwise shrinkable stretched plastic film in conjunction with the wrapping carriage, the

film girdle will shrink and tighten around the product to be packaged when it is transferred onto the surface of the product to be packaged. The tightening force can be adjusted by suitably selecting the plastic film and/or its pre-stretching.

- 5 According to the invention, during the wrapping operation the girdle to be produced by wrapping is most preferably located outside the product to be packaged, at a distance from it. However, the girdle to be produced by wrapping need not be aligned with the product to be packaged. Preferably the products to be packaged can be moved on the track so that the area on the product where a wrapping or bandage is to be formed comes into a
- 10 position aligned with the girdle, whereupon the girdle is transferred onto the product.

A second preferred embodiment of the method of the invention is characterized in

- that wrapping film band is wrapped over the supporting frame consisting of supporting elements, thus forming a film girder tube on the supporting frame,
- 15 - that a plastic film girder of desired length is cut off the film girder tube,
- that the product to be packaged and/or the plastic film girder are/is moved on the track so that the product to be packaged remains inside the plastic film girder cut off,
- and that the supporting frame consisting of supporting elements is removed from inside the plastic film girder and the plastic film girder is allowed to shrink and tighten
- 20 around the product to be packaged.

A third preferred embodiment of the method of the invention is characterized in

- that wrapping film band is wrapped over the supporting frame consisting of supporting elements in a continuous manner so that a film girder tube continuously increasing in
- 25 length is formed on the supporting frame,
- that a plastic film girdle of desired length is cut off the plastic film girdle tube during the wrapping operation
- that, while the wrapping operation is being continued, the product to be packaged and/or the plastic film girdle is moved on the track so that the product to be packaged
- 30 remains inside the plastic film girdle cut off,
- and that the supporting frame consisting of supporting elements is removed from inside the plastic film girdle and the plastic film girdle is allowed to shrink and tighten around the product to be packaged.

- 35 The continuous method is very fast and efficient because the wrapping packaging machine can be continuously in operation, producing wrapped tube, from the end of which a girdle of suitable width is cut off, which girdle then tightens around the product to be packaged that comes to the appropriate position while advancing on the track.

## DEVICE OF THE INVENTION

The invention also relates to a device for applying a plastic film around a product (16) to be packaged, said device comprising

- 5 - a supporting frame consisting of supporting elements and having over it a plastic film girdle of shrinkable and/or stretchable plastic, said girdle having a circumference larger than the circumference of the product to be packaged,
- transfer elements for transferring the product to be packaged and/or the plastic film girdle so that the product to be packaged remains inside the plastic film girdle,
- 10 - means for removing the supporting elements from inside the plastic film girdle, allowing the plastic film girdle to tighten around the product to be packaged.

## FEATURES OF THE DEVICE OF THE INVENTION

The device of the invention is characterized in that the device comprises

- 15 - a wrapping system for wrapping a shrinkable and/or stretchable plastic film band from a film reel over the supporting elements so that the wrapping film band being wrapped forms on the supporting elements a plastic film girdle tightening over the product to be packaged,
- and transfer elements for transferring the product to be packaged and/or the plastic film girdle formed from the wrapping plastic film band so that the product to be packaged remains inside the plastic film girdle,
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## EMBODIMENTS OF THE DEVICE OF THE INVENTION

A preferred embodiment of the device of the invention is characterized in

- 25 - that the supporting elements of the device, on which the wrapping plastic film band can be wrapped to form a plastic film girdle, form a preferably rectangular supporting frame whose width and height are larger than the width and height of the product to be packaged,
- and that each corner of the supporting frame consisting of supporting elements is provided with at least one supporting element, which can be moved to transfer the plastic film girdle to a position around the product to be packaged.
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A second preferred embodiment of the device of the invention is characterized in that the device has at the corners of the supporting frame supporting element pairs which can be turned or moved away from each other to pass the plastic film girdle wrapped over the supporting elements to a position around the product to be packaged.

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A third preferred embodiment of the device of the invention is characterized in that the device comprises

- a wrapping system and supporting elements for wrapping a wrapping plastic film band to form a plastic film tube having a circumference larger than the circumference of the product to be packaged,
- a clipper for cutting the plastic film girdle off the plastic film tube,
- and which plastic film tube supporting elements also constitute plastic film girdle transfer elements, such as endless bands or rotating bars.

A fourth preferred embodiment of the device of the invention is characterized in

- that, in the device, the wrapping system for wrapping the wrapping plastic film band to form a plastic film tube is a continuously working system
- and that the supporting elements in the device consist of two parts such that the first part of the supporting elements is a base on which the wrapping of the wrapping plastic film band is carried out while the second part of the supporting elements is a transfer part for transferring the plastic film girdle cut off by the clipper.

#### EMBODIMENT EXAMPLES

In the following, the invention will be described in detail with reference to examples and the attached drawings, wherein

#### LIST OF FIGURES

- Fig. 1 presents a diagrammatic side view of a wrapping machine according to an embodiment of the invention during a girdle wrapping operation.
- Fig. 2 corresponds to Fig. 1 and presents the wrapping machine in a situation where the girdle is ready to be transferred onto the surface of the product to be packaged.
- Fig. 3 corresponds to Fig. 1 and presents the wrapping machine in a situation where the girdle is being transferred onto the surface of the product to be packaged.
- Fig. 4 corresponds to Fig. 1 and presents the wrapping machine in a situation where the girdle has tightened on the surface of the product to be packaged.
- Fig. 5 presents diagrammatic side view of the wrapping machine of the invention as seen from the direction of the track at the initial stage of a girdle wrapping operation.
- Fig. 6 corresponds to Fig. 5 and presents the wrapping machine when the girdle is being seamed.
- Fig. 7 corresponds to Fig. 5 and presents the wrapping machine in situation corresponding to Fig. 3, where the girdle is being transferred onto the surface of the product to be packaged.

Fig. 8 presents a diagrammatic view of a second embodiment of the wrapping machine of the invention.

Fig. 9 presents a diagrammatic view of a third embodiment of the wrapping machine of the invention.

5 Fig. 10 presents a diagrammatic view of a third embodiment of the wrapping machine of the invention.

### DESCRIPTION OF THE FIGURES

Fig. 1 presents a side view of a wrapping machine 10 according to an embodiment of the invention, comprising a track 11 and a rotating ring 12. Attached to the track 12 is a film  
10 dispensing carriage, which is provided with a film reel 14 containing wrapping plastic film 15. Placed on top of the product 16 to be packaged moving on the track 11 are transverse pieces 17a and 17b to facilitate later manipulation of the product, said pieces being bound in the same bundle with the product 16 itself by means of girdles to be produced by  
15 wrapping.

The wrapping machine 10 in Fig. 1 is provided with a wrapping support system 20 comprising four supporting elements 21a-21d, which can be turned about axles 23a-23d and which are located on either side of the track 11 and therefore of the product 16 to be  
20 packaged. All the supporting elements 21a-21d have straight sides 22a-22d, which in the wrapping position shown in Fig. 1 together form a supporting frame, on which the film girdle 18 to be produced from plastic film 15 by wrapping can be formed.

In the situation illustrated in Fig. 1, the wrapping operation for producing a film girdle 18 is  
25 going on. However, the product to be packaged 16 is not yet aligned with the girdle 18 because, according to the invention, the girdle 18 can be finished beforehand and only then transferred onto the surface of the product 16. As shown in Fig. 1, the product to be packaged 16 is placed on the track 11 and moving towards the wrapping station 20. By using adjusting elements comprised in the device, the supporting frame consisting of  
30 supporting elements 21a-21d has been adjusted to be larger than the product 16 to be packaged, so that the film girdle 18 being produced will be large enough to allow the product 16 being packaged to be moved inside the film girdle supported by the supporting frame.

35 In Fig. 2, the wrapping operation producing a film girdle 18 has been completed. The films forming the film girdle 18 supported by the supporting elements 21a-21d have now been seamed and the plastic film band coming from the reel 14 has been severed. However, the plastic film band need not always be seamed if the film band layers placed one over the

other are otherwise held fast on each other sufficiently well. At the same time, the product 16 to be packaged has moved on the track 11 so that transverse piece 17a is aligned with the film girdle 18 in the wrapping station 20. The ring 12 and film dispensing carriage 13 connected to it have been stopped for a short while, during which the film girdle 18 is transferred onto the product 16 to be packaged and the transverse piece 17a, as illustrated in the next figures 3 and 4. The end of the film band 15 coming from the film reel 14 is held fast by a gripper 24 and is ready for the start of a wrapping operation for producing the next film girdle.

In Fig. 3, the transfer of the film girdle 18 onto the product 16 to be packaged and the transverse piece 17a has been started by having the supporting elements 21a-21d turned about the axles 23a-23d. the film girdle 18 formed from stretched film 15 can now descend onto the product 16 and tightens over the transverse piece 17a and the product 16 to be packaged so that these become bound together by the girdle 18.

In Fig. 4, the film girdle 18 has been tightened over the product 16 to be packaged and the transverse piece 17a. the supporting elements 21a-21d have been turned about the axles 23a-23d to their outermost position, so the film girdle 18 has been able to be transferred onto the surface of the product 16 to be packaged. In this situation, the formation of the film girdle 18 has been completed and the supporting elements 21a-21d begin to turn again to the position of readiness shown in Fig. 1 and a ready for the next film girdle wrapping operation. Therefore, the rotating motion of the ring 12 can be quickly started and the wrapping operation for forming the next film girdle, which is to be wrapped over transverse piece 17b, can be started immediately. The product 16 to be packaged also starts moving and is again at the right position on the track 11 when the next film girdle is ready to be mounted.

Fig. 5 presents a wrapping machine 10 according to the invention as seen from the direction of the track 11. A wrapping operation for forming a film girdle around a product 16 to be packaged has just been started. The end of the plastic film band 15 coming the film reel 14 is held in the gripper 24 and the ring 12 has rotated through a nearly full revolution. During the second revolution, the end of the wrapping plastic film band 15 can be released from the gripper 24 because the film layers wrapped upon each other stick together. After that, the wrapping action for forming a film girdle is continued until the number of layers of film 15 is e.g. three.

In Fig. 6, three layers of wrapping plastic film band 15 have been wrapped one upon the other. The ring is now stopped again for a short while and the seaming and cutting device



25 seams the wrapping plastic film layers to form a closed film girdle 18. At the same time, the gripper 24 grips the plastic film band 15 coming from the reel 14 so that it will be ready for the start of the wrapping operation for forming the next film girdle.

5 In Fig. 7, the seaming and cutting device 25 has released its grip and the film girdle 18 is continuous and ready to be transferred onto the product 16 to be packaged. In Fig. 7, the supporting elements 21a-21d move in the directions indicated by the arrows, allowing the film girdle 18 to tighten around the product 16 to be packaged and over the transverse piece 17.

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Fig. 8 presents the wrapping support system 20 of the wrapping machine of the invention according to a second embodiment. In this embodiment, the wrapping support system 20 is simpler than in the example illustrated in the previous figures because it comprises only two supporting elements 21a-21b on either side of the product 16 to be packaged. In such  
15 a structure, the film girdle 18 is transferred onto the product 16 to be packaged in a lopsided manner with one edge first. The device works just as well, at least if the product 16 to be packaged is heavy. In the case of lighter objects, it is preferable to use during the transfer of the film girdle a clutch known in itself, which presses the product 16 to be packaged from above, thus holding it reliably in place. The clutch is not shown in the  
20 figures.

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In the embodiment presented in Fig. 9, the supporting elements 21a-21b in the wrapping support system 20 of the wrapping machine are endless belts, over which the film girdle 18 is wrapped. The finished film girdle 18 is cut off by means of a clipper 26 and transferred  
25 onto the product 16 to be packaged by means of second endless belts forming extensions of belts 21a-21b in the manner illustrated in Fig. 9. In this case it is preferable to have also the product 16 to be packaged simultaneously moving in the direction indicated by the arrow, thus accomplishing continuous mounting of plastic film girdles around the products to be packaged.

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Fig. 10 presents yet another embodiment of the wrapping machine of the invention, in which the supporting elements 21a-21d in the wrapping support system 20 are rotating bars, over which the wrapping plastic film 15 is wound from the film reel 14. The film reel 14 and the bars 21a-21b are so disposed with respect to each other as to also allow a  
35 continuous wrapping action for forming a film girdle 18 over the bars 21a-21b, the product thus obtained being a plastic film tube 18b, which is cut off by means of a clipper 26 to form a film girdle 18a of suitable length. As the bars 21a-21b are rotating, the film girdle

18a cut off advances to the right in Fig. 10 and is first transferred onto second reels and then onto the product 16 to be packaged.

#### ADDITIONAL REMARKS

- 5 It is obvious to the person skilled in the art that different embodiments of the invention may be varied within the scope of the claims presented below.

#### LIST OF REFERENCE NUMBERS

- |    |    |                            |
|----|----|----------------------------|
| 10 | 10 | Wrapping machine           |
|    | 11 | Track                      |
|    | 12 | Ring                       |
|    | 13 | Carriage                   |
|    | 14 | Film reel                  |
| 15 | 15 | Film                       |
|    | 16 | Product to be packaged     |
|    | 17 | Transverse piece           |
|    | 18 | Film girdle                |
|    | 20 | Wrapping support system    |
| 20 | 21 | Supporting element         |
|    | 22 | Straight side              |
|    | 23 | Axle                       |
|    | 24 | Gripper                    |
|    | 25 | Seaming and cutting device |
| 25 | 26 | Clipper                    |